



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE- Other instructions on reverse side.

1. Type of Well <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> <input type="checkbox"/> Gas Well <input type="checkbox"/> Other	OCT 28 2008
2. Name of Operator COG Operating LLC	OCD-ARTESIA
3a. Address 550 W. Texas Ave., Suite 1300 Midland, TX 79701	3b. Phone No. (include area code) 432-685-4332
4. Location of Well (Footage, Sec., T, R., M., or Survey Description) SHL: 1980 FNL & 430 FWL BHL: 1980 FNL & 330 FEL Section 21, T16S, R28E, UL E Section 21, T16S, R28E, UL H	

FORM APPROVED
OMB No. 1004-0137
Expires March 31, 2007

5. Lease Serial No NMNM-100844
6. If Indian, Allottee or Tribe Name
7. If Unit or CA/Agreement, Name and/or No
8. Well Name and No Reindeer 21 Federal #3
9. API Well No. 30-015-36538
10. Field and Pool, or Exploratory Area Crow Flats, Wolfcamp
11. County or Parish, State Eddy County, NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Fracture Treat	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input type="checkbox"/> Recomplete	<input checked="" type="checkbox"/> Other
	<input type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

COG Operating LLC respectfully requests permission to:

Change Field and Pool from Wolfcamp to Crow Flats; Abo
To change proposed Casing & Cementing Program;
To change Pilot Hole TD to 6780' MD;

Request a variance to the 200' minimum tie back in order to set the pump as close to the formation as possible. The curve and horizontal are all located in the Abo Formation.

Attached is a revised Form 3160-03 Drill Plan with changes reflected in shaded areas.

**SEE ATTACHED FOR
CONDITIONS OF APPROVAL**

14. I hereby certify that the foregoing is true and correct Name (Printed/Typed) Phyllis A. Edwards		Title Regulatory Analyst
Signature <i>Phyllis A. Edwards</i>		Date 09/22/2008
THIS SPACE FOR FEDERAL OR STATE OFFICE USE		
Approved by Conditions of approval, if any, are attached Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon	Title Office	Date OCT 22 2008
Title 18 USC Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.		

(Instructions on page 2)

Accepted for record - NMOCD



REVISED 09/12/2008

- | | |
|--------------------|---------|
| Quaternary | Surface |
| Yates/Seven Rivers | 600' |
| Queens | 1125' |
| San Andres | 1950' |
| Glorietta | 3350' |
| Abo | 5375' |
| Top Basal Abo | 6530' |

- | | | |
|---------------|-------------|-------|
| Water Sand | Fresh Water | 150' |
| San Andres | Oil / Gas | 1950' |
| Glorietta | Oil / Gas | 3350' |
| Abo | Oil / Gas | 5375' |
| Top Basal Abo | Oil / Gas | 6530' |

- | <u>Hole size</u> | <u>Interval</u> | <u>OD of Casing</u> | <u>Weight</u> | <u>Cond.</u> | <u>Collar</u> | <u>Grade</u> |
|---|-----------------|---------------------|---------------|--------------|---------------|--------------|
| 17-1/2" | 0' - +/-500' | 13-3/8" | 48# | New | STC | H40 |
| Collapse sf - 2.98, Burst sf - 2.33, Tension sf - 13.42 | | | | | | |
| 12 1/4" | 0' - +/-1800' | 9-5/8" | 40# | New | STC | J-55 |
| Collapse sf - 2.46, Burst sf - 1.35, Tension sf - 6.48 | | | | | | |
| 8-3/4" | 0' - +/-6000'MD | 7" | 26# | New | LTC | P-110 |
| Collapse sf - 2.18, Burst sf - 1.53, Tension sf - 4.37 | | | | | | |
| 6-1/8" 5900' | +/-10809"MD | 4-1/2" | 11.6# | New | LTC | P-110 |
| Collapse sf - 2.47, Burst sf - 1.64, Tension sf - 4.48 | | | | | | |

ATTACHMENT TO FORM 3160-3
COG Operating LLC
Reindeer "21" Federal # 3
Page 2 of 3

7. Cement Program ← see COA

13 3/8" Surface Casing set at +/- 500', Circ to Surf with +/- 500 sx Class "C" w/ 2% CaCl₂, 1.35 yd.

see COA 9 5/8" Intermediate Casing set at +/- 1800', Circ. to Surf with +/- 700 sx 50/50 Poz "C", 2.45 yd. & 200 sx Class "C" w/ 2% CaCl₂, 1.35 yd.

7" Production Casing set at +/- 6000' MD, Cement with +/- 500 sx. 50/50/10 "C", 2.45 yd & +/- 200 sx Class "H", 1.18 yd., Est. TOC @ 200' minimum tie back into intermediate casing.

4 1/2" Production Liner set from +/- 5900' to +/- 10809' MD, 6520' TVD, Liner run with +/- 5 isolation Packers and Sliding sleeves in un-cemented Lateral.

8. Pressure Control Equipment:

After setting 13 3/8" casing and installing 3000 psi casing head, NU 13 5/8" 3000 psi annular BOP. Test annular BOP, casing and manifold with clear fluid to 1000 psi w/ rig pump.

After setting 9 5/8" casing and installing 3000 psi casing spool, NU 3000 psi double ram BOP and 3000 psi annular BOP. Test double ram BOP and manifold to 3000# with clear fluid and annular to 1500 psi using an independent tester, this equipment will be used continuously until TD is reached. Blind rams will be operationally checked on each trip out of hole. Pipe rams will be operationally checked each 24 hour period. These checks will be noted on daily tour sheets. Other accessories to the BOP equipment include a Kelly cock and floor safety valves, choke lines and choke manifold with 3000 psi WP rating.

9. Proposed Mud Circulating System

Interval	Mud Wt.	Visc.	FL	Type Mud System
0' - 500'	8.5	28	NC	Fresh water native mud w/ paper for seepage and sweeps. Lime for PH.
see COA 500' - 1800'	9.1	30	NC	Fresh Cut brine mud, lime for PH and paper for seepage and sweeps.
1800' - 6550'	9.1	29	NC	Drill section with fresh water/cut brine circulating the reserve utilizing periodic sweeps of paper as needed for seepage control and solids removal.
6550' - 10809'	9.5	36	10	Drill horizontal section with XCD polymer / cut brine / starch.

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept at the well site at all times.

10. Production Hole Drilling Summary:

see COA Drill 8-3/4" pilot hole thru Top Basal Abo to +/- 6780', run open hole logs. Spot 350 sx "H" Kick off plug from +/- 6500' to +/- 5900'. Dress off to 6000' and set 7" production casing. Drill 6-1/8" hole and kick off at +/- 6150', building curve over +/- 350' to horizontal at 6550' TVD. Drill horizontal section in a Easterly direction for +/- 4400' lateral to TD at +/- 10809' MD, 6520' TVD. Run 4-1/2" production liner in Open hole lateral and set isolation packers and liner top packer @ +/- 5900' MD

ATTACHMENT TO FORM 3160-3
COG Operating LLC
Reindeer "21" Federal # 3
Page 3 of 3

11. Auxiliary Well Control and Monitoring Equipment

- A. Kelly cock will be kept in the drill string at all times.
- B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

12. Logging, Testing and Coring Program:

- A. The electric logging program will consist of GR-Dual Laterolog, Spectral Density, Dual Spaced Neutron, CSNG Log and will be ran from T.D. in Pilot hole to 9 5/8" casing shoe.
- B. The mud logging program will consist of lagged 10' samples from intermediate casing point to T.D. in vertical pilot hole and from Kick off point to TD in Horizontal hole.
- C. Drill Stem test is not anticipated.
- D. No conventional coring is anticipated.
- E. Further testing procedures will be determined after the 4 1/2" production liner packers have been installed at TD based on drill shows and log evaluation.

13. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:

No abnormal pressures or temperatures are anticipated. The estimated bottom hole at TD is 110 degrees and estimated maximum bottom hole pressure is 2838 psig. Low levels of Hydrogen sulfide have been monitored in producing wells in the area, so H2S may be present while drilling of the well. An H2S plan is attached to the Drilling Program. No major loss of circulation zones has been reported in offsetting wells.

14. Anticipated Starting Date

Drilling operations will commence approximately on November 1, 2008 with drilling and completion operations lasting approximately 90 days.

DISTRICT I
1626 N French Dr., Hobbs, NM 88240
DISTRICT II
1301 W Grand Avenue, Artesia, NM 88210
DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410
DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-102
Revised October 12, 2005

Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-015- <u>36538</u>	Pool Code <u>97102</u>	Pool Name CROW FLATS: ABO
Property Code 36817	Property Name REINDEER "21" FEDERAL	Well Number 3
OGRID No. 229137	Operator Name C.O.G. OPERATING L.L.C.	Elevation 3587'

Surface Location

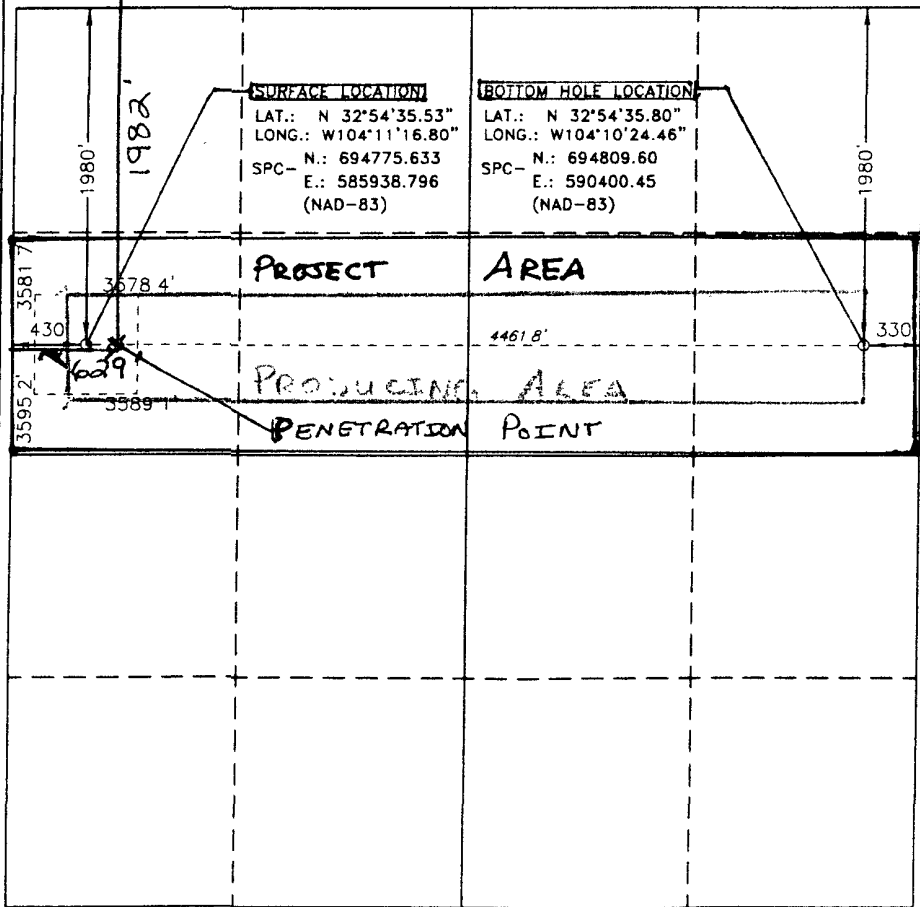
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	21	16 S	28 E		1980	NORTH	430	WEST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	21	16 S	28 E		1980	NORTH	330	EAST	EDDY

Dedicated Acres 160	Joint or Infill	Consolidation Code	Order No.
------------------------	-----------------	--------------------	-----------

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

	<p>OPERATOR CERTIFICATION</p> <p>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p><u>Phyllis A. Edwards</u> Signature Date 8-04-08</p> <p>Phyllis A. Edwards Printed Name Regulatory Analyst</p> <p>SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</p> <p>NOVEMBER 25, 2007</p> <p>Date Surveyed Signature of Gary L. Jones Professional Surveyor</p> <p>W. L. Jones 8-24-04</p> <p>Certificate No Gary L. Jones 7977</p> <p>BASIN SURVEYS</p>
---	--

COG Operating LLC

Reindeer 21 Federal #3

S21 T16S R28E

Reindeer 21 Federal #3

Original Hole

Plan: Plan #1

Pathfinder Survey Report

22 February, 2008

C.O.G. Operating L.L.C.



Azimuths to Grid North
True North: -0.08°
Magnetic North: 8.23°

Magnetic Field
Strength: 49313.6snT
Dip Angle: 60.81°
Date: 2/22/2008
Model: IGRF200510

Project: Reindeer 21 Federal #3
Site: S21 T16S R28E
Well: Reindeer 21 Federal #3
Wellbore: Original Hole
Plan: Plan #1 (Reindeer 21 Federal #3/Original Hole)

PATHFINDER ENERGY SERVICES

WELL DETAILS Reindeer 21 Federal #3

Ground Elevation 3587.00
RXB Elevation EST RXB @ 3587.00h
Rig Name

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	894775.833	885938.798	32° 54' 35.530 N	104° 11' 16.797 W	

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	6072.55	0.00	0.00	6072.55	0.00	0.00	0.00	0.00	0.00	
3	6826.13	90.43	89.56	6550.00	3.69	481.03	12.00	89.56	481.05	
4	6872.79	90.43	89.56	6549.85	4.05	527.89	0.01	67.03	527.70	
5	10806.98	90.43	89.56	6520.00	33.97	4481.85	0.00	0.00	4481.78	PBHL

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

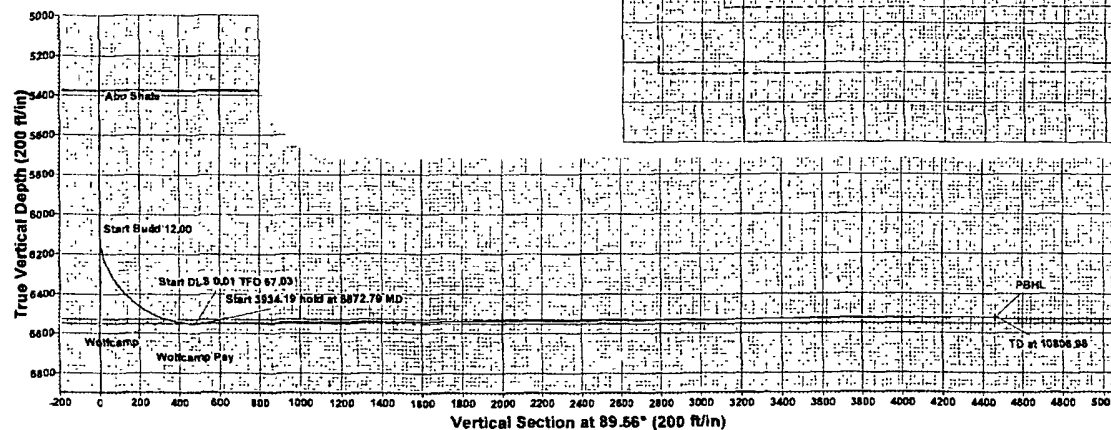
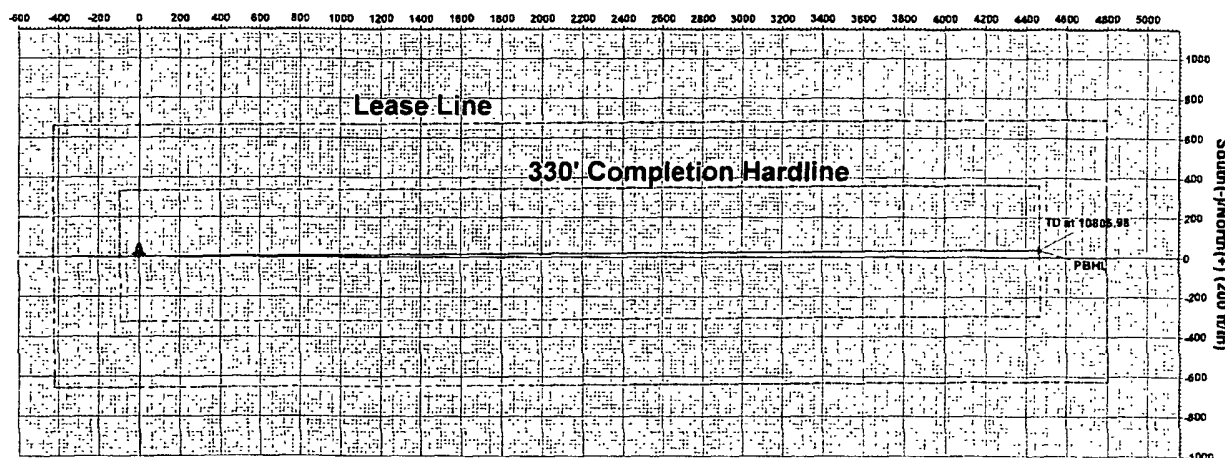
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL	6520.00	33.97	4481.85	894809.600	590400.450	Point

PROJECT DETAILS: Reindeer 21 Federal #3
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
800.00	180.00	Yates
1125.00	1125.00	Queen
1850.00	1950.00	San Andres D
3350.00	3350.00	Glorieta
5375.00	6375.00	Abo Shale
6520.00	6482.81	Wolfcamp
6550.00	6418.78	Wolfcamp Pay

West(-)/East(+) (200 ft/in)



Plan: Plan #1 (Reindeer 21 Federal #3/Original Hole)

Created By: Mark Freeman Date: 10:56, February 22, 2008

Checked: _____ Date: _____

WHS
Pathfinder Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Reindeer 21 Federal #3
Project:	Reindeer 21 Federal #3	TVD Reference:	EST RKB @ 3587.00ft
Site:	S21 T16S R28E	MD Reference:	EST RKB @ 3587.00ft
Well:	Reindeer 21 Federal #3	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 2003.16 Single User Db

Project	Reindeer 21 Federal #3, Eddy County, NM		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	S21 T16S R28E		
Site Position:		Northing:	694,775.633 ft
From:	Map	Easting:	585,938.796 ft
Position Uncertainty:	0.00 ft	Slot Radius:	"
		Latitude:	32° 54' 35.530 N
		Longitude:	104° 11' 16.797 W
		Grid Convergence:	0.08 °

Well	Reindeer 21 Federal #3		
Well Position	+N/-S	0.00 ft	Northing: 694,775.633 ft
	+E/-W	0.00 ft	Easting: 585,938.796 ft
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft
		Latitude:	32° 54' 35.530 N
		Longitude:	104° 11' 16.797 W
		Ground Level:	3,587.00 ft

Wellbore	Original Hole		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF200510	2/22/2008	8.31
			Dip Angle (°)
			60.81
			Field Strength (nT)
			49,314

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			Direction (°)
			89.56

Survey Tool Program	Date 2/22/2008		
From	To	Survey (Wellbore)	Tool Name
(ft)	(ft)		
0.00	10,806.97	Plan #1 (Original Hole)	MWD
			Description
			MWD - Standard

Planned Survey								
MD	Inc	Azi	TVD	N/S	E/W	V. Sec	DLeg	
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00

WHS
Pathfinder Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Reindeer 21 Federal #3
Project:	Reindeer 21 Federal #3	TVD Reference:	EST RKB @ 3587.00ft
Site:	S21 T16S R28E	MD Reference:	EST RKB @ 3587.00ft
Well:	Reindeer 21 Federal #3	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 2003.16 Single User Db

Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	EW (ft)	V. Sec (ft)	DLeg (°/100ft)
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00

WHS

Pathfinder Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Reindeer 21 Federal #3
Project:	Reindeer 21 Federal #3	TVD Reference:	EST RKB @ 3587.00ft
Site:	S21 T16S R28E	MD Reference:	EST RKB @ 3587.00ft
Well:	Reindeer 21 Federal #3	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 2003.16 Single User Db

Planned Survey								
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	
6,072.55	0.00	0.00	6,072.55	0.00	0.00	0.00	0.00	
6,075.00	0.29	89.56	6,075.00	0.00	0.01	0.01	12.00	
6,100.00	3.29	89.56	6,099.98	0.01	0.79	0.79	12.00	
6,125.00	6.29	89.56	6,124.89	0.02	2.88	2.88	12.00	
6,150.00	9.29	89.56	6,149.66	0.05	6.27	6.27	12.00	
6,175.00	12.29	89.56	6,174.22	0.08	10.95	10.95	12.00	
6,200.00	15.29	89.56	6,198.49	0.13	16.91	16.91	12.00	
6,225.00	18.29	89.56	6,222.42	0.19	24.13	24.13	12.00	
6,250.00	21.29	89.56	6,245.94	0.25	32.60	32.60	12.00	
6,275.00	24.29	89.56	6,268.99	0.32	42.28	42.28	12.00	
6,300.00	27.29	89.56	6,291.49	0.41	53.16	53.16	12.00	
6,325.00	30.29	89.56	6,313.40	0.50	65.20	65.20	12.00	
6,350.00	33.29	89.56	6,334.65	0.60	78.37	78.37	12.00	
6,375.00	36.29	89.56	6,355.18	0.71	92.63	92.63	12.00	
6,400.00	39.29	89.56	6,374.93	0.83	107.95	107.95	12.00	
6,425.00	42.29	89.56	6,393.85	0.95	124.28	124.28	12.00	
6,450.00	45.29	89.56	6,411.90	1.09	141.58	141.58	12.00	
6,475.00	48.29	89.56	6,429.01	1.23	159.80	159.80	12.00	
6,500.00	51.29	89.56	6,445.15	1.37	178.89	178.89	12.00	
6,525.00	54.29	89.56	6,460.26	1.53	198.80	198.80	12.00	
6,550.00	57.29	89.56	6,474.31	1.69	219.47	219.48	12.00	
6,575.00	60.29	89.56	6,487.27	1.85	240.85	240.86	12.00	
6,600.00	63.29	89.56	6,499.08	2.02	262.88	262.89	12.00	
6,625.00	66.29	89.56	6,509.73	2.19	285.49	285.50	12.00	
6,650.00	69.29	89.56	6,519.17	2.37	308.64	308.65	12.00	
6,675.00	72.29	89.56	6,527.40	2.55	332.24	332.25	12.00	
6,700.00	75.29	89.56	6,534.37	2.74	356.25	356.26	12.00	
6,725.00	78.29	89.56	6,540.08	2.92	380.58	380.59	12.00	
6,750.00	81.29	89.56	6,544.51	3.11	405.18	405.19	12.00	
6,775.00	84.29	89.56	6,547.65	3.30	429.98	429.99	12.00	
6,800.00	87.29	89.56	6,549.48	3.49	454.91	454.92	12.00	
6,826.13	90.43	89.56	6,550.00	3.69	481.03	481.05	12.00	
6,872.79	90.43	89.56	6,549.65	4.05	527.69	527.70	0.01	
6,900.00	90.43	89.56	6,549.45	4.26	554.90	554.91	0.00	
7,000.00	90.43	89.56	6,548.69	5.02	654.89	654.91	0.00	
7,100.00	90.43	89.56	6,547.94	5.78	754.88	754.91	0.00	
7,200.00	90.43	89.56	6,547.18	6.54	854.88	854.90	0.00	
7,300.00	90.43	89.56	6,546.43	7.30	954.87	954.90	0.00	
7,400.00	90.43	89.56	6,545.68	8.06	1,054.87	1,054.90	0.00	

WHS
Pathfinder Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Reindeer 21 Federal #3
Project:	Reindeer 21 Federal #3	TVD Reference:	EST RKB @ 3587.00ft
Site:	S21 T16S R28E	MD Reference:	EST RKB @ 3587.00ft
Well:	Reindeer 21 Federal #3	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 2003.16 Single User Db

Planned Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)
7,500.00	90.43	89.56	6,544.92	8.82	1,154.86	1,154.90	0.00
7,600.00	90.43	89.56	6,544.17	9.58	1,254.86	1,254.89	0.00
7,700.00	90.43	89.56	6,543.42	10.34	1,354.85	1,354.89	0.00
7,800.00	90.43	89.56	6,542.66	11.10	1,454.84	1,454.89	0.00
7,900.00	90.43	89.56	6,541.91	11.86	1,554.84	1,554.88	0.00
8,000.00	90.43	89.56	6,541.16	12.62	1,654.83	1,654.88	0.00
8,100.00	90.43	89.56	6,540.40	13.38	1,754.83	1,754.88	0.00
8,200.00	90.43	89.56	6,539.65	14.14	1,854.82	1,854.88	0.00
8,300.00	90.43	89.56	6,538.89	14.90	1,954.82	1,954.87	0.00
8,400.00	90.43	89.56	6,538.14	15.66	2,054.81	2,054.87	0.00
8,500.00	90.43	89.56	6,537.39	16.42	2,154.80	2,154.87	0.00
8,600.00	90.43	89.56	6,536.63	17.18	2,254.80	2,254.86	0.00
8,700.00	90.43	89.56	6,535.88	17.95	2,354.79	2,354.86	0.00
8,800.00	90.43	89.56	6,535.13	18.71	2,454.79	2,454.86	0.00
8,900.00	90.43	89.56	6,534.37	19.47	2,554.78	2,554.86	0.00
9,000.00	90.43	89.56	6,533.62	20.23	2,654.78	2,654.85	0.00
9,100.00	90.43	89.56	6,532.86	20.99	2,754.77	2,754.85	0.00
9,200.00	90.43	89.56	6,532.11	21.75	2,854.76	2,854.85	0.00
9,300.00	90.43	89.56	6,531.36	22.51	2,954.76	2,954.84	0.00
9,400.00	90.43	89.56	6,530.60	23.27	3,054.75	3,054.84	0.00
9,500.00	90.43	89.56	6,529.85	24.03	3,154.75	3,154.84	0.00
9,600.00	90.43	89.56	6,529.10	24.79	3,254.74	3,254.84	0.00
9,700.00	90.43	89.56	6,528.34	25.55	3,354.74	3,354.83	0.00
9,800.00	90.43	89.56	6,527.59	26.31	3,454.73	3,454.83	0.00
9,900.00	90.43	89.56	6,526.84	27.07	3,554.72	3,554.83	0.00
10,000.00	90.43	89.56	6,526.08	27.83	3,654.72	3,654.82	0.00
10,100.00	90.43	89.56	6,525.33	28.59	3,754.71	3,754.82	0.00
10,200.00	90.43	89.56	6,524.57	29.35	3,854.71	3,854.82	0.00
10,300.00	90.43	89.56	6,523.82	30.11	3,954.70	3,954.82	0.00
10,400.00	90.43	89.56	6,523.07	30.87	4,054.70	4,054.81	0.00
10,500.00	90.43	89.56	6,522.31	31.63	4,154.69	4,154.81	0.00
10,600.00	90.43	89.56	6,521.56	32.39	4,254.68	4,254.81	0.00
10,700.00	90.43	89.56	6,520.81	33.15	4,354.68	4,354.80	0.00
10,806.98	90.43	89.56	6,520.00	33.97	4,461.65	4,461.78	0.00

WHS
Pathfinder Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Reindeer 21 Federal #3
Project:	Reindeer 21 Federal #3	TVD Reference:	EST RKB @ 3587.00ft
Site:	S21 T16S R28E	MD Reference:	EST RKB @ 3587.00ft
Well:	Reindeer 21 Federal #3	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 2003.16 Single User Db

Targets									
Target Name	Dip Angle	Dip Dir:	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
PBHL	0 00	0.00	6,520.00	33.97	4,461.65	694,809.600	590,400.450	32° 54' 35.803 N	104° 10' 24.459 W
- plan hits target									
- Point									

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(ft)	(ft)			(°)	(°)	
1,125.00	1,125.00	Queen		0.00		
600.00	600.00	Yates		0.00		
5,375.00	5,375.00	Abo Shale		0.00		
1,950.00	1,950.00	San Andres D		0.00		
6,683.81	6,530.00	Wolfcamp		0.00		
3,350.00	3,350.00	Glorieta		0.00		
6,818.79	6,550.00	Wolfcamp Pay		0.00		

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------

PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
LEASE NO.:	LC-100844
WELL NAME & NO.:	3-Reindeer 21 Federal
SURFACE HOLE FOOTAGE:	1980' FNL & 430' FWL
BOTTOM HOLE FOOTAGE:	1980' FNL & 330' FEL
LOCATION:	Section 21, T. 16 S., R 28 E., NMPM
COUNTY:	Eddy County, New Mexico

I. DRILLING

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified a minimum of 4 hours in advance for a representative to witness:

- a. Spudding well
- b. Setting and/or Cementing of all casing strings
- c. BOPE tests

☒ **Eddy County**

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

1. **Although Hydrogen Sulfide has not been reported in this section, it is always a potential hazard. If Hydrogen Sulfide is encountered, please report measured amounts and formations to the BLM.**
2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

B. CASING

Changes to the approved APD casing and cement program require submitting a sundry and receiving approval prior to work. Failure to obtain approval prior to work will result in an Incident of Non-Compliance being issued.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) time for a primary cement job will be a minimum 18 hours for a water basin, 24 hours in the potash area, or 500 pounds compressive strength, whichever is greater for all casing strings. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. See individual casing strings for details regarding lead cement slurry requirements.

No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

High cave/karst area.

Possible lost circulation in the Grayburg and San Andres formations.

High pressure gas bursts possible within the Wolfcamp formation – applies to the pilot hole.

- 1. The 13-3/8 inch surface casing shall be set in the Tansill Formation at approximately 500 feet and cemented to the surface.**
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with a surface log readout will be used or a cement bond log shall be run to verify the top of the cement.**
 - b. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.**
 - c. If cement falls back, remedial cementing will be done prior to drilling out that string.**

Fresh water mud to be used to setting depth for the 9-5/8" casing.

2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:

- ☒ Cement to surface. If cement does not circulate see B.1.a-c above.
Intermediate casing is to be set at approximately 2200' within the San Andres formation as it is a more competent formation than the Queen and Grayburg formations. Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst concerns.

If 75% or greater lost circulation occurs while drilling the intermediate casing hole, the cement on the production casing must come to surface with the wait on cement (WOC) time for a primary cement job to include the lead cement slurry due to cave/karst concerns.

3. The minimum required fill of cement behind the 7 inch production casing is:

- ☒ Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification.

A plug is required at the bottom of the pilot hole to 50' above the Wolfcamp formation top – plug to be a minimum of 170' in length. Plug is to be tagged. Recommend that operator consider placing plug from bottom of hole to kick-off point, which will eliminate the need for the tag on the bottom plug.

4. The minimum required fill of cement behind the 4-1/2 inch production liner is:

- ☒ No cement required – using packer system. No seal test required as the liner is entirely within the Abo formation. Liner tie-back of 100' approved.

5. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. The tests shall be done by an independent service company.

- b. The results of the test shall be reported to the appropriate BLM office.
- c. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- d. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug.
- e. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the **Wolfcamp** formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.
- f. A variance to test the surface casing and BOP/BOPE (**entire system**) to the reduced pressure of **1000** psi with the rig pumps is approved.

D. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the **Wolfcamp** formation, and shall be used until production casing is run and cemented.

E. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

WWI 102208